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TASK ANALYSIS OF STATE AND LOCAL AIR POLLUTION CONTROL AGENCIES, AND DEVELOPMENT OF STAFFING GUIDELINES

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Applied Science Associates, Incorporated

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TASK ANALYSIS OF STATE AND LOCAL AIR POLLUTION CONTROL AGENCIES, AND DEVELOPMENT OF STAFFING GUIDELINES

Technical Report

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Manpower Development Staff Office of Air Programs
Research Triangle Park, North Carolina 27711

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● Technical Report

TASK ANALYSIS
OF STATE AND LOCAL AIR POLLUTION
CONTROL AGENCIES,
AND DEVELOPMENT
OF STAFFING GUIDELINES

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Prepared for the
United States Environmental Protection Agency
Manpower Development Staff
Office of Air Programs
Research Triangle Park, North Carolina 27711
November 1972

This is not an official policy and standards document. The opinions, findings, and conclusions are those of the authors and not necessarily those of the United States Environmental Protection Agency. Every attempt has been made to represent the present state of the art as well as subject areas still under evaluation. Any mention of products, or organizations, does not constitute endorsement by the United States Environmental Protection Agency.

THIS IS:
TECHNICAL REPORT
Task Analysis of State and Local
Air Pollution Control Agencies, and
Development
of Staffing Guidelines

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VOLUME E: Guidance and Supporting Information for Staffing and Training Decisions in an Air Pollution Control Agency - Air Monitoring and Meteorological Support

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SUMMARY

In order to begin to answer questions relevant to manpower planning and development, a data base was prepared which describes the tasks to be performed by control agency personnel and the skills and knowledge they must have to perform those tasks effectively. In addition, guidance concerning the use of the data base in making staffing decisions was prepared.

The project was performed in two phases. Phase I resulted in the development of a detailed data base describing the major tasks performed by agency personnel in terms of the procedural components of the tasks and the skills and knowledge required to perform them. Phase II resulted in production of a guidance document which integrates and structures data developed in Phase I and presents it in a form designed to assist agency manpower developers.

The basic approach taken to identify and initially describe the tasks performed at control agencies was to interview agency personnel and have them describe their jobs in detail. The control agencies selected to visit and the people to interview were chosen to maximize the likelihood that:

1. Coverage of tasks would be relatively complete and results of the skill and knowledge analysis would apply to both comprehensive and non-comprehensive agencies (the latter by inclusion).
2. Task performers interviewed would be relatively proficient in their work such that the resulting task descriptions would reveal a thorough and effective means of performing the task.
3. The tasks described would be representative of those performed in state and local agencies across the country.

The data supplied from interviews with over 200 agency personnel in all areas of agency activity were submitted to task analysis. The purpose

of the analysis was to identify representative tasks, describe them in detail, and identify required skills and knowledge.

The resulting data base detailed findings in task areas including:

1. High Level Administration
2. Emission Inventory
3. Episode Control
4. Plan Review and Permits
5. Source Testing
6. Complaint Handling
7. Patrolling
8. Inspection
9. Ambient Air Quality Monitoring
10. Laboratory Analysis
11. Meteorology
12. Development of New Regulations
13. Public Information
14. Compliance and Enforcement

The second phase of the project was aimed at organizing and amplifying the task data collected in Phase I. The goal was to develop an information system which could be used by agency planners to support decision making in the areas of staffing and training. Specifically, the system assists in solving problems including:

1. Determining the type of person to hire to perform a specific task and the content of the required training.
2. Identifying the tasks to which a current staff member may be assigned and the training which will be needed to support the transition.

Phase II of the project included the following basic activities:

1. Review of the task data amassed in Phase I in order

to determine groups of related tasks which could be performed by identifiable occupational categories.

2. Development of a group of occupational categories which are capable of efficiently learning to perform sets of related tasks within agency function.

3. Assignment of the occupational categories to the appropriate tasks. Wherever possible, tasks were restructured so that they were suitable to one occupational category.

4. Preparation of staffing and training guidelines and supporting data in a form which would be useful to agency manpower planners.

The result of Phase II was a seven-volume document entitled "Guidance and Supporting Information for Staffing and Training Decisions in an Air Pollution Control Agency," which is available from the Environmental Protection Agency (EPA), Office of Air Programs.

FOREWORD

This report was prepared by Applied Science Associates, Inc., of Valencia, Pennsylvania, to meet the requirements of Contract No. 68-02-0306 with the Environmental Protection Agency.

The project staff consisted of the following:

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The project staff would like to express its gratitude to the many individuals who contributed to the project. The Appendix contains a listing of the over 200 people who participated in the data collection phase of the contract effort and the members of the National Air Pollution Manpower Development Advisory Committee who reviewed the final products. Their help is sincerely acknowledged.

Special appreciation is extended to the members of the staff of Applied Science Associates who closely supported the project group: to Mr. George R. Purifoy, Jr., who as Program Scientist provided invaluable guidance, and to Mrs. Jeane Heath, whose consistent and expert effort made production of this document possible.

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INTRODUCTION

One of the pressing problems in the air pollution control effort at Federal, state, and local levels is planning manpower requirements and developing manpower resources. Questions are being asked such as, how many people are needed, what kind of past experience and education should they have, how should their jobs be structured, what do they need to know to do their jobs, what special abilities do they need, and what kind of training should they receive to do their jobs? These questions are becoming increasingly meaningful as the control effort broadens with the creation of more and more local agencies and as existing agencies increase the scope and depth of their programs. Adequate answers are required if progress is to continue toward the goal of clean air.

In order to begin to answer questions relevant to manpower planning and development, a data base describing the tasks to be performed by control agency personnel and the skills and knowledge they must have to perform those tasks effectively must be available. Guidance concerning the use of the data base in making staffing decisions must be prepared. It is the purpose of this study to provide such a data base and the appropriate guidance.

A. Objectives

The objectives of this project were the following:

1. To identify as great a proportion as possible of the population of tasks currently being performed by air pollution control agency personnel at the state and local level throughout the country.
2. To describe the identified tasks in terms of component behaviors and the skills and knowledge required to perform those behaviors.
3. To identify and describe categories of air pollution control agency personnel who would perform the tasks mentioned above.

continued

4. To structure and communicate the data which resulted from achieving the above objectives in a form which could be used by agency management in planning and developing manpower resources.

B. General Project Overview

The project was performed in two phases. Phase I dealt with achieving the first two project objectives, and resulted in the development of a detailed data base describing the major tasks performed by agency personnel in terms of the procedural components of the tasks and the skills and knowledge required to perform them. Phase II dealt with achieving the last two major objectives, and resulted in production of a guidance document which integrates and structures data developed in Phase I and presents it in a form designed to assist agency manpower developers.

PHASE I

Description and Skill and Knowledge Analysis of Tasks Performed by Personnel in State and Local Air Pollution Control Agencies

As mentioned earlier, the goal of Phase I was to identify and describe in detail as great a proportion as possible of the population of tasks currently performed in state and local air pollution control agencies.

In devising and performing Phase I the general goal of developing a data base to support manpower planning and manpower resource development was emphasized. It was intended that such a data base could ultimately be used to support activities including:

1. Identifying training requirements and training objectives for agency personnel.
2. Identifying agency personnel selection criteria and developing selection procedures or guidelines.
3. Identifying the need for performance aids to assist on-the-job performance of agency personnel.
4. Assisting agencies in developing their activities and services in terms of scope and depth.
5. Assisting agencies in developing their functional organization.
6. Providing guidance to agencies in defining their staffing requirements (e.g., in terms of what numbers and types of personnel to acquire).

A. Basic Concepts and General Overview

Briefly, the method taken to develop the required data base was task analysis. Task analysis is the process of examining a task and describing

it in terms of certain attributes. In the present case tasks were to be described in terms of their operational components and the skills and knowledge required to perform those components. The following definitions were used:

1. A task is considered a group of unitary operations having a common purpose, directed toward the same specific output, and usually occurring in close temporal proximity.

2. Knowledge is the information required by the task performer to successfully complete the task. This information usually includes task procedures; resource data; and special knowledge such as equipment nomenclature, technical jargon, hazards to be avoided, etc. Task information can be made available through a number of media, including books, tape recordings, and conversation.

3. Skills are behaviors with unique requirements for speed and accuracy such that they typically must be learned and practiced before they can be performed adequately.

The basic approach taken to identify and initially describe the tasks performed at control agencies was to interview agency personnel and have them describe their jobs in detail. The control agencies selected to visit and the people to interview were chosen to maximize the likelihood that:

1. Coverage of tasks would be relatively complete and results of the skill and knowledge analysis would apply to both comprehensive and non-comprehensive agencies (the latter by inclusion).

2. Task performers interviewed would be relatively proficient in their work such that the resulting task descriptions would reveal a thorough and effective means of performing the task.

3. The tasks described would be representative of those performed in state and local agencies across the country.

B. Approach

The approach taken to develop task descriptions and analyze them for skill and knowledge requirements consisted of four activities: a pilot study; selection of agencies to use in data collection; data collection; and data synthesis and analysis.

Pilot Study. The goal of the pilot study was to make a preliminary survey of the daily operations of a representative comprehensive control agency to learn the types of tasks the staff performed. This preliminary data would be useful in developing a strategy and method for selecting the agencies to visit to obtain task information during data collection. Also, if of sufficient quality, the pilot data could be combined with data collected in the larger data collection effort.

The agency surveyed was the Allegheny County Air Pollution Control Bureau located in Pittsburgh, Pennsylvania. The rationale for selecting this agency was that it was judged to be comprehensive in its basic functions, representative of that class of agency, and readily accessible for daily observation by the project staff from Applied Science Associates, Inc. (ASA).

The data collected in the pilot study resulted from a series of interviews with staff members working in all the major functional areas of the agency's activity. The people interviewed are included on the list in the Appendix (page 34). The first interview was with a member of the agency management staff, who described the history, organization, and general activities of the agency. Following this, a series of interviews was held. Each of the interviews was aimed at gathering the following information from the respondent:

1. The tasks he routinely performed.
2. The objective of each task.
3. A brief outline of the elements or steps involved in each task.
4. A brief summary of the equipment, materials, and resource materials used.

From the information collected during the pilot study, the project staff was able to construct a preliminary list of task areas which could be used to categorize the activities of control agency personnel. Also, it was possible to gain an early appreciation for the scope, organization, and complexity of tasks routinely performed at a comprehensive air pollution control agency.

Agency Selection. The goal of the agency selection effort was to identify a group of state and local comprehensive air pollution control agencies which could be visited for data collection purposes. At these agencies the project staff would carry out a series of interviews similar to those performed in the pilot study but on a broader scale and aimed at gaining greater detail. The criteria for selecting agencies would be the following:

1. The agency's program should be comprehensive, that is, it should incorporate a wide range of services and activities. Such comprehensive agencies would offer the most efficient data collection in that all of the task areas of interest could be covered with the fewest agency visits.
2. Each of the services or activities of the agency should be performed thoroughly, that is, the tasks should be performed at an adequate level of detail.
3. The agency's activities and methods should be relatively effective in accomplishing the goals of air pollution control.

To the best knowledge of the project staff, there is no concise, objective, and easily accessible source of information ranking air pollution control agencies on the above criteria. Therefore, it was decided to gather independent judgments from various experts with experience observing and evaluating agencies throughout the country. From these judgments it was anticipated that a consensus listing of comprehensive, thorough, and relatively effective agencies could be developed.

The process of selecting agencies to visit consisted of four steps.

1. Contact was made with personnel of the Division of Control Agency Development (CAD) of the Environmental Protection Agency (EPA). This organization has been and is currently involved in evaluating air pollution control agencies throughout the nation. A meeting was held with a group of CAD evaluators (listed in the Appendix, page 33) at which they suggested relatively effective, thorough, and comprehensive agencies for each of the task areas identified in the pilot study. The task areas considered were the following:

    a. High Level Administration

    b. Emission Inventory

    c. Episode Control

    d. Plan Review and Permits

    e. Source Testing

    f. Complaint Handling

    g. Patrolling

    h. Inspection

    i. Ambient Air Quality Monitoring

    j. Laboratory Analysis

    k. Meteorology

    l. Development of New Regulations

    m. Public Information

    n. Compliance and Enforcement

    o. Applied or Basic Research

As a result of this meeting a list of 22 "candidate" agencies was identified as having met the criteria in the selected task areas, with some of the agencies being more proficient in more areas than the others.

2. The next step was to make telephone contact with the EPA Regional Air Pollution Control Offices for the regions containing the agencies suggested by CAD. The purpose of the contact was to ask the Assistant Regional Directors the same questions asked of CAD, however, with the judgments constrained to the director's region. That is, for each of the task areas, the judges were asked to suggest the agencies in their region which performed in that area effectively. Generally, the choices of the regional officers agreed with the suggestions made by the CAD judges. The regional people surveyed are listed in the Appendix, page 33.

3. The final set of expert judges was a group of individuals who were familiar with agency activities in specific task areas. They were asked to suggest agencies which were relatively thorough and effective in performance for those task areas familiar to the judge. The group of individuals used for this survey are also listed in the Appendix, on page 33.

4. After all the judgments were in from the above surveys, the project staff assembled a consensus list of 14 comprehensive state and local agencies. Due to budgetary, temporal, and other practical constraints, the list was narrowed down to the following agencies:

   a. Allegheny County (Pennsylvania) Bureau of Air Pollution Control

   b. New Jersey State Bureau of Air Pollution Control

   c. Commonwealth of Pennsylvania Bureau of Air Pollution Control

   d. City of Chicago Department of Environmental Control

e. Wayne County (Michigan) Air Pollution Control Division

f. State of Michigan Air Pollution Control Section

g. California Air Resources Board

h. Puget Sound Air Pollution Control Agency (State of Washington)

i. Los Angeles County Air Pollution Control District

It should be noted that the above agencies should not be construed as the "most" thorough, comprehensive, or effective agencies in the country. They were selected for use for the following reasons:

a. They were judged to be relatively proficient in several of the relevant task areas.

b. As a group they complemented one another in terms of effective task areas such that the combination provided ample coverage of all task areas.

c. They included a variety of geographic areas, topographical and meteorological conditions, and pollution problems.

d. They could all be included in data collection within the time and budgetary constraints of the project.

Data Collection. Generally, the approach taken in data collection was for members of the project staff to visit each of the agencies and to conduct interviews with selected personnel. The interviews were conducted with people working in the task areas for which the agency was judged to be proficient. Managers, supervisors, and operating staffs were covered in these areas. In addition, as time permitted, interviews were held with personnel working in the remaining task areas. In all cases the agency director was interviewed. A total of some 200 individuals were interviewed, many of whom met with the project staff on several occasions. The respondents are listed in the Appendix (starting on page 34) by agency and task area discussed.

The interviews were relatively unstructured and open-ended. However, all interviews were directed toward identifying the tasks performed by the respondent and the specific steps or elements of behavior involved in each of these tasks. In addition, the interview sought to identify all of the equipment, materials, and supporting documentation used in performing the task and how these items were used. Wherever possible, samples of working materials and documents were secured for later analysis.

Because of the scope of the data collection effort (in terms of the number and variety of jobs involved) and the level of detail required to identify skills and knowledge, a cumulative approach to data collection was adopted. This approach required each data collection interview to build on the data base acquired in previous interviews with the respondent or with personnel in the previously covered agencies. That is, questions were asked to identify and describe task characteristics not already determined in earlier interviews. When all of the data relevant to a particular task area (e.g., plan review) was collected, the evolving task descriptions and the skill and knowledge analysis could be based on a composite of data collected across all respondents in that task area.

In addition to the task data collected directly through interviews, the project staff was able to gather an extensive library of resource documents and performance aids (e.g., equipment maintenance manuals) used by agency personnel on the job. After determining how and when these materials were used, they could be analyzed to identify the skills and knowledge implied by their use in task performance.

Data Analysis. The data analysis process consisted of identification of the tasks to include in the analysis, development or identification of an adequate task description, and analysis of the description to identify required skills and knowledge.

1. Identification of Tasks. The goal of this aspect of the analysis was to determine which of the reported activities and behaviors should be grouped as a task unit. The criterion for defining the limits on tasks was both logical and pragmatic. The objective of identifying a task was to describe its elements so that skills and knowledge required to perform those tasks could be derived later. Most of the probable uses for the

resulting skill and knowledge descriptors (e.g., training development, manpower planning) required that they be at a relatively molar level of detail. If the behaviors these descriptors reflected were too minute (e.g., small arm movements or specific arithmetic calculations) they would be of relatively little value for their ultimate use. Therefore, in order for an activity or behavior to be classified as a task it had to be divisible into elements or steps that could be described at a level of detail judged appropriate for the ultimate uses of the task analysis data. If the activity did not satisfy this criterion it was considered to be an element or step within a task rather than a task itself.

In addition to the above general criterion, the following additional guidelines were used for selecting tasks for detailed description and analysis:

a. Clerical tasks were not included.

b. Only tasks that were currently performed at the agencies visited were included. That is, tasks that had been discontinued or were planned for the future were not included.

2. Task Description. The skills and knowledge required to perform a task must be derived from a detailed description of the steps or elements of the task. The purpose of this component of data analysis was to identify or develop a task description which was suitable to support skill and knowledge analysis. The type of task description developed or identified depended on the degree to which the tasks reported were performed in a proceduralized manner. The following types of task description were used for skill and knowledge analysis:

a. Empirically Determined Descriptions. In cases where respondents were able to describe their tasks as procedures, a step-by-step description for accomplishing the task was prepared.

b. Reference Based Descriptions. In some cases respondents reported that they adhered to a formal procedure presented in a reference document (e.g., a manual of chemical testing procedures). In such tasks the written procedure was secured and was used as the basis for further analysis.

c. Rationally Determined Descriptions. In many cases tasks were performed routinely by agency personnel which they could not adequately describe as a step-by-step procedure. They may perform the task in a different manner each time it is done, or the task may be performed by several people all contributing to the product (e.g., in developing an emission inventory). In such cases it was necessary for the project staff to synthesize a systematic set of steps or elements for the task. For example, in preparing a public information presentation there is no set procedure to follow. However, for the purposes of identifying the skill and knowledge requirements, a systematic description of the task in terms of its elements was developed. These descriptions were prepared from the collected task data on a rational, rather than on an empirical, basis.

3. Skill and Knowledge Analysis. Each task was next analyzed to identify the skills and knowledge required to effectively perform it as described. Briefly, the knowledge required was represented by the information (either learned, in the form of resource data, or in performance aids) needed by the task performer. Skills were those task behaviors which had to be practiced before they could be performed adequately. That is, assuming the task performer had all the required information, he would still have to practice certain components

of the task before he could do them effectively. These components were considered skills. Throughout the skill and knowledge analysis, the base level of ability and knowledge assumed for the task performer on all tasks was that of a high school graduate.

C. Results

The results of Phase I provided a fundamental data base of task information describing the efforts of air pollution control agencies.

The Form of the Results. The product of Phase I was a collection of task descriptive information covering all of the major functional areas of agency activity Each of the tasks or activities identified was described in terms of:

1. A title for the task or activity.
2. A detailed description of the component operations and behaviors required for the task. This task description reflects the approaches of a composite of agencies surveyed. Thus, it is possible that no one of the agencies surveyed performs all of the tasks identified in precisely the manner described.
3. A list of the skills required to effectively perform the activity.
4. A list of knowledge elements required to perform the activity.
5. References to source materials which provide some of the information used to perform the activity.

The actual findings of Phase I comprise the major portion of the seven volumes of the integrated product of both Phase I and Phase II. This document will be described in some detail at the conclusion of the section of this report dealing with Phase II of the project.

A Note on Air Monitoring Equipment Maintenance Tasks. It is clear that the population of equipment maintenance tasks is extensive. There are many

manufacturers and each produces various models. It is not unusual that equipment be modified to suit the specific needs of a particular agency, thus producing virtual "one of a kind" tasks. The task data developed in Phase I relevant to operation and maintenance of ambient air monitoring equipment is representative of such tasks as they are performed in the agencies. The strategy followed here to identify and describe equipment operation and maintenance tasks was the following:

1. Table 1 was adopted to structure the data collection effort.[1]
2. During data collection the equipment used at each agency was identified in terms of poilutant, measurement principle, make and model.
3. The manufacturers of equipment representative of that described in Table 1 and currently used by agencies visited were contacted. Operation and maintenance manuals for the equipment of interest were requested. The following manufacturers were contacted:
    a. Beckman Instruments
    b. Bendix Environmental
    c. Clayton Manufacturing Co.
    d. Climet Instruments Co.
    e. Davis Instrument Co.
    f. Hartmann and Braun
    g. Intertech Corporation
    h. Mine Safety Appliances Co.
    i. Research Appliance Co.
    j. Technicon Instruments Co.
4. The manufacturers whose manuals provided task descriptions which were detailed enough to provide a basis for skill and knowledge analysis were used for that purpose. The specific equipment

[1]This table is adopted from a table published in Guide for Air Pollution Episode Avoidance. Research Triangle Park, North Carolina: Environmental Protection Agency, Office of Air Programs, Publication No. AP-76, June 1971, p. 35.

Table 1

A Summary of Air Sampling and Monitoring Equipment
As a Function of Pollutant and Measurement Principle

Pollutant	Measurement Principle	Equipment Analyzed
Aldehydes	Colorimetric	
CO	Non-Dispersive IR	MSA Lira Infrared Analyzer (Model 300)
	Detector Tube	
Fluoride	Colorimetric	Technicon Air Monitoring IV System (Part No. 181-A001-03)
Hydrocarbons	Flame Ionization	Beckman Hydrocarbon Analyzer (Model 400)
	Gas Chromatography	MSA Process Gas Chromatographic Analyzer (Model 650) and Programmer (Model 525)
Hydrogen Sulfide	Chemisorption on tape	RAC A.I.S.I. Automatic Sampler (Model G-2)
	Colorimetric	Technicon Air Monitoring IV System (Part No. 181-A001-03)
	Detector Tube	
	Wet Chemical Method	RAC Sequential Sampler (Model PV)
Nitrogen Oxides	Colorimetric	Technicon Air Monitoring IV System (Part No. 181-A001-03)
	Coulometric	Beckman NO Analyzer (Model 909) Beckman NO_2 Analyzer (Model 910)

Table 1 (continued)

Pollutant	Measurement Principle	Equipment Analyzed
Oxidants	Colorimetric	Technicon Air Monitoring IV System (Part No. 181-A001-03)
	Coulometric	Beckman Oxidants Analyzer (Model 908)
Particulates	Transmission or Reflectance Gravimetric	RAC A.I.S.I. Automatic Sampler (Model G-2) RAC High Volume Sampler (Model GMWL)
Sulfur Dioxide	Conductivity	
	Colorimetric	Technicon Air Monitoring IV System (Part No. 181-A001-03)
	Coulometric	Beckman Sulfur Dioxide Analyzer (Model 906)
	Flame Photometric	

covered in the analysis is listed in Table 1. The ability to use common hand tools and knowledge of the equipment configuration and operation are assumed to be required for all maintenance tasks included in the analysis.

PHASE II

Development of Guidance Materials for Staffing and Training Decisions

This phase of the project was aimed at organizing and amplifying the task data collected in Phase I. The goal was to develop an information system which could be used by agency planners to support decision making in the areas of staffing and training. Specifically the system would assist in solving problems including:

1. Determining the type of individual to hire to perform a specific agency task or activity and identifying the content of the training that person would require to adequately perform the task.

2. Identifying the tasks to which current agency personnel could be assigned and determining the training content they would require for the new assignment.

A. Basic Concepts and General Overview

The approach taken in Phase II was intimately related to several key concepts. An early effort was made to structure the concepts of an "Occupational Category" and of a "task" to reveal their interrelationship.

1. Occupational Category - a category of agency personnel who, with the appropriate training is capable of effectively performing one or more of a group of related tasks. These tasks are related in the sense that they require skills and knowledge which are relatively similar in terms of factors including content area, required academic background, and basic abilities.

2. Task - as defined earlier, a group of unitary operations having a common purpose, directed toward the same output, and usually occurring in close temporal proximity. A further requirement was added at this point. Tasks should be sufficiently homogeneous with regard to associated skills and knowledge that they are performable by a single occupational

category. Also, a task should be internally consistent with regard to the level of capability required within the occupational category, thus permitting a high level of efficiency in assigning personnel to specific tasks.

With these concept definitions, it was clear that an appropriate approach for identifying the pool of occupational categories required for agency tasks and for assigning these categories to specific tasks was to perform the following activities:

1. Review the task data amassed in Phase I in order to determine groups of related tasks which could be performed by identifiable occupational categories.
2. Develop a group of occupational categories which would be capable of efficiently learning to perform sets of related tasks within agency function.
3. Assign the occupational categories to the appropriate tasks. Whenever possible, tasks should be structured so that they are suitable to one occupational category.
4. Prepare staffing and training guidelines and supporting data in a form which would be useful to agency manpower planners.

Each of the above activities is described in detail in the Approach section of this report.

B. Approach

Detailed Review of Task Data. The first step in implementing the strategy for Phase II was to closely inspect the tasks identified in Phase I and their associated skills and knowledge chararacteristics. The purpose of this effort was to determine how tasks cluster with regard to similarities in their skill and knowledge requirements. These clusters form the basis of work to be accomplished by specific types of personnel and must be identified in order to define the occupational categories.

The review of task data was accomplished in the following steps:

1. The total population of skills and knowledge identified in Phase I was combined into a single, non-repetitive listing. This list was used as a tool for the following activity.

2. The skill and knowledge requirements were identified for each task on a step-by-step basis (whereas in Phase I the requirements were identified for the task as a whole), using the exhaustive list as the range of alternatives. Because of the more specific focus and the broadened range of possible abilities, the number of skills and knowledge associated with each task was increased. Also, the skill and knowledge requirements for each step or element within the tasks were now known.

Development of Occupational Categories. As a result of the detailed review of tasks, task elements, and their associated skill and knowledge requirements, it was possible to parcel out the work responsibilities to discernable occupational categories (as defined above). Generally, the tasks and ability requirements appeared to cluster in terms of relatively homogeneous technical/scientific disciplines (e.g., engineering, meteorology, chemistry) or more diverse functional groups (e.g., management, field enforcement, program planning). Also, it was clear that some tasks within each cluster would be more efficiently learned and effectively performed by college-trained people. In the project

staff's opinion, tasks demanding a college level individual are those with the following characteristics:

1. Tasks which are typically unproceduralized. Unproceduralized tasks have the following characteristics:

    a. They are not standardized in terms of how they are to be performed; complete, detailed instructions for them are not available; and creativity and ability to meet a wide variety of unpredictable contingencies are required to perform them. Evaluation of plans in a permit processing system is an unproceduralized task. On the other hand, inspection of a private residence incinerator is an example of a relatively proceduralized task.

    b. They demand broad-based conceptual level knowledge in order to make decisions or solve problems.

    c. They require heavy emphasis on judgment rather than concrete rules.

2. Tasks which require credibility in order to be effectively performed. The term "credibility" as used in this project refers to the extent to which a college degree is expected by the agency's constituency (e.g., the general public, industry, citizen groups, lawmakers). For certain tasks in the agency a college degree is a "credential" which greatly enhances the individual's ability to perform his function, for example: negotiating a compliance program with representatives of an industry; addressing legislators regarding new regulations; forecasting pollution conditions which legally limit industrial activity. To be maximally effective an individual performing such tasks must be accepted as an authority in his field, and in our society a formal education is a minimum, however critical, requirement for such acceptance.

At this point it was possible to hypothesize a minimum number of occupational categories which appeared suitable to cover all of the tasks

identified. Each category (loosely defined) referred to the type of individual capable of efficiently learning to perform a set of related tasks within an air pollution control agency. At a later stage in this Phase they would be described in greater detail. The categories selected were the following:

1. Air Pollution Control Director - a college-trained individual involved in high level management of the agency.
2. Resources Administrator - a college-trained individual capable of managing the agency's financial, personnel, and material resources.
3. Program Planning and Development Specialist - college-trained personnel involved in high level problem solving and policy development.
4. Engineer - college-trained personnel involved in agency engineering tasks.
5. Engineering Technician - para-professionals who support the agency's engineering efforts.
6. Chemist - college-trained individuals involved in tasks requiring broad knowledge and skill in chemistry and allied fields.
7. Chemical Laboratory Technician - para-professionals who perform proceduralized chemical analyses.
8. Meteorologist - college-trained personnel involved in certain meteorological support tasks.
9. Meteorological Technician - para-professionals involved in certain meteorological support tasks.
10. Field Enforcement Officer - non-college-level individuals involved in routine, relatively proceduralized enforcement activities.

11. Public Information Specialist - a college-trained individual who prepares public information presentations.

12. Equipment Technician - non-college-level individuals who operate, calibrate, and maintain selected agency instruments and other equipment.

Assignment of Occupational Categories to Tasks. At this point each task identified in Phase I was reviewed to determine which of the above occupational categories was appropriate for it. Since the skill and knowledge requirements were known at the level of steps or task elements, it was possible to identify the tasks which contained steps or elements which were suitable to more than one occupational category. Wherever possible, such tasks were restructured into two separate activities, each suitable to one occupational category.

The criteria used for assigning occupational categories to tasks were the following:

1. Specialized Content Area. Was the task an engineering task, a chemical task, a field enforcement task, etc.? This question was answered by characterizing the skill and knowledge requirements and overall task objectives.

2. Educational Background. Was a college degree required? Did the task have substantial credibility requirements? Was the task typically proceduralized?

At the completion of this step, each task in the data base had an appropriate occupational category assignment. Table 2 presents a list of the tasks in the data base and the occupational category(s) suggested for each task.

Preparation of a Staffing and Training Guidance Document. The final project activity was aimed at integrating all of the data, concepts, and judgments developed throughout the project into a document which would assist agency management in decisions relevant to training and staffing. The resulting document, entitled "Guidance and Supporting Information for Staffing and Training Decisions in an Air Pollution Control Agency," contains seven separately bound volumes--a user's manual and six volumes of detailed task data and staffing guidance. The Results section of this

Table 2

Task Titles and Suggested Occupational Categories

Task Title	Occupational Category
Engineering	
Development and Production of an Emission Inventory	Engineer
Reception and Preliminary Screening of Plan Review/ Permit System Applications and Supporting Materials	Engineering Technician
Review of Plans and Application Forms in a Plan Review/Permit System	Engineer
Engineering Inspection	Engineer
Design and Construction of an Episode Control System	Engineer
Review of Application for Tax Exemption on Air Pollution Control Equipment	Engineering Technician or Engineer
Field Enforcement	
Routine Inspection	Field Enforcement Officer
Complaint Investigation	Field Enforcement Officer
Patrol of Assigned Areas or Routes and Citation of Violators of Air Pollution Control Regulations	Field Enforcement Officer
Assist the Legal Staff in Preparation of Enforcement Actions	Field Enforcement Officer
Serving as a Witness in Court or at a Hearing	Field Enforcement Officer, Engineer, Chemist, Meteorologist, Air Pollution Control Director, Resources Administrator
Organization and Operation of a Smokeschool	Field Enforcement Officer
Laboratory Support	
Determination of Nitrogen Dioxide and Nitric Oxide Concentrations in the Atmosphere Using the Saltzman Method	Chemical Laboratory Technician
Determination of Sulfur Dioxide Concentration in the Atmosphere Using the West-Gaeke Method	Chemical Laboratory Technician
Determination of Sulfur Dioxide and Sulfur Trioxide Concentrations in Stack Gases	Chemical Laboratory Technician
Determination of Suspended Particulate Concentration in the Atmosphere by Means of High Volume Sampling	Chemical Laboratory Technician
Determination of Hydrogen Sulfide Concentration in the Atmosphere Using the Methylene Blue Method	Chemical Laboratory Technician
Determination of Nitrate Concentration in Suspended Atmospheric Particulates Using the 2, 4 Xylenol Method	Chemical Laboratory Technician
Determination of Sulfate Concentration in Suspended Atmospheric Particulates Using the Turbidimetric Barium Sulfate Method	Chemical Laboratory Technician
Determination of Metal Concentration in Suspended Atmospheric Particulates by Means of High Volume Sampling	Chemical Laboratory Technician
Determination of Particulate Concentration in Stack Emissions	Chemical Laboratory Technician
Identification of the Constituents of Dust Particles	Chemical Laboratory Technician or Equipment Technician
Maintenance of Laboratory Devices	Equipment Technician
Supervision of Laboratory Support Tasks	Chemist
Development of New Methods for the Analysis of Air Pollutants	Chemist

Table 2 (continued)

Air Monitoring and Meteorological Support

Task Title	Occupational Category
Operation and Maintenance of the Flame Ionization Hydrocarbon Analyzer	Equipment Technician
Operation and Maintenance of the Infrared Analyzer	Equipment Technician
Operation and Maintenance of the Coulometric Titration Analyzers for SO_2, NO, NO_2, or Oxidants	Equipment Technician
Operation and Maintenance of the Gas Chromatograph Analyzer Programmer	Equipment Technician
Operation and Maintenance of the Gas Chromatograph Analyzer	Equipment Technician
Operation and Maintenance of the Colorimetric Air Monitoring System	Equipment Technician
Operation and Maintenance of the Sequential Sampler	Equipment Technician
Operation and Maintenance of the High Volume Air Sampler	Equipment Technician
Operation and Maintenance of the A.I.S.I. Automatic Sampler	Equipment Technician
Operation and Maintenance of the Wind Speed Transmitter	Equipment Technician
Operation and Maintenance of the Wind Direction Transmitter	Equipment Technician
Supervision of Air Monitoring Equipment Operation and Maintenance Tasks	Chemist
Use of the Smog Chamber as a Tool in Photochemical Smog Research	Equipment Technician
Design of an Air Monitoring Facility	Chemist
Routine Forecast of Meteorological Conditions and Pollution Levels or Effects	Meteorologist
Assemble Meteorological Data and Describe Climatological Conditions	Meteorological Technician
Problem Solving Using Mathematical Models	Meteorologist

Source Testing

Performance of a Stack Test	Equipment Technician
Managing a Stack Test	Engineer
Determination of Odor Concentration in the Atmosphere or in Stack Emissions	Equipment Technician
Performing a Used Car Inspection	Equipment Technician
Performing the Idle and ACID Tests	Equipment Technician
Planning the Dynamometer Installation	Engineer
Operation and Maintenance of the Engine Dynamometer	Equipment Technician
Operation and Maintenance of the Chassis Dynamometer	Equipment Technician

Agency Management, Program Development, and Public Information Support

High Level Agency Management	Air Pollution Control Director
Agency Resources Management	Resource Administrator or Program Planning and Development Specialist
Technical Management	Engineer, Chemist, Meteorologist, Field Enforcement Officer
Literature Review and Data Summary Regarding Ambient Air Quality Standards	Program Planning and Development Specialist
Development of New or Modified Regulations	Program Planning and Development Specialist
Support of Development of Local Control Programs	Program Planning and Development Specialist
Preparation of a Public Information Presentation	Public Information Specialist

report contains a brief description of the seven volumes which were prepared.

At the conclusion of Phase II the guidance document was submitted to review and critique by the eleven-member National Air Pollution Manpower Development Advisory Committee (See Appendix, Page 41, for the list of members). The Committee evaluated the document in terms of the accuracy of its content and its usefulness as an aid for staffing and training decisions. To the extent possible, all of the committee's comments were incorporated in the final version of the document.

C. Results

The following is a brief description of the seven-volume document entitled "Guidance and Supporting Information for Staffing and Training Decisions in an Air Pollution Control Agency":

Volume A: Introduction and Directions for Use

This volume contains information of the following types:

1. A brief overview of the project which produced the guideline document, including project objectives, working concepts, methodology, and information outputs.

2. A set of Occupational Category Descriptions (OCD), one for each of the twelve categories identified in Phase II. Each OCD was designed to identify the type of individual who, if provided the appropriate training or education, could perform specific agency tasks and to describe such an individual in a manner which would help the agency secure the proper person to learn each task. The OCD's were not designed to match any particular local merit system or civil service personnel description system, but should be generally relatable across such systems.

   Each OCD contains the following information about the individuals in the category:

   a. Category Title. Whenever the category is referred to throughout the guide and data volumes, the title is used (e.g., Engineer, Associate Chemist).

   b. General Duties. This segment of an OCD describes the general role of personnel in that category within agency activities. Major functional areas of agency activity in which such individuals participate are identified and their tasks described generally.

c. Representative Assignments. This portion of the OCD presents a list of specific tasks to which members of the category may be assigned. The list, in most cases, contains tasks which were studied carefully and which are detailed in the task data volumes. The list is meant to be representative, rather than exhaustive.

d. Representative Skill and Knowledge Qualifications. These are the general skills and knowledge which a member of the category should have to serve as a basis for acquiring the skills and knowledge required for the specific tasks he will be assigned.

e. Minimum Acceptable Educational Background. This section of the OCD states the minimum acceptable level of formal education suggested to efficiently learn to perform the tasks to which members of the category may be assigned. In all cases this suggested level will have to be augmented with training or education to supply the specific skills and knowledge required to perform the assigned tasks. Volume A provides a list of possible sources of this advanced training but does not suggest specific programs for each task.

Finally, with regard to level within a category, each OCD applies to both senior and junior members of the category. Senior members are individuals who have broadened and deepened their abilities through comprehensive experience on the job. As such, they could be called on to perform tasks requiring increased abilities, including:

a. Developing, evaluating, or applying new techniques.

b. Preparing procedures to be used by junior members of the staff.

c. Training junior staff members.

d. Performing job-related tasks requiring unusually high credibility.

e. Supervising junior staff members.

f. Planning and coordinating job-relevant tasks.

g. Performing job relevant tasks characterized by unusual contingencies.

h. Performing job-relevant tasks for which unusual time constraints are imposed.

i. Performing job-relevant tasks requiring skill or knowledge not currently available in the junior level staff.

A full set of the OCD's is included in the Appendix of this technical report, beginning on page 42.

3. Volume A also contains a matrix which lists each task identified in the project, the occupational category assigned to it, and a page number in the guidance document where the reader can find relevant task descriptive data and staffing guidance.

4. Volume A contains directions for use of the total guidance document (all seven volumes) to answer specific questions regarding training and staffing. The major issues the document deals with are:

   a. Determining the type of person to hire to perform a specific task and the content of the required training.

   b. Identifying the tasks to which a current staff member may be assigned and the training that will be needed to support the transition.

5. Finally, Volume A contains a discussion of the limitations on the uses of the materials contained in the data volumes (e.g., types of tasks not included in the data base.)

Volumes B through G: Detailed Task Data and Staffing Guidance

These six volumes contain the descriptive task data and staffing guidance provided for all of the tasks identified in the project, and accompany the user's manual (Volume A). Each data volume deals with one or more functionally related sets of agency tasks, as follows:

1. Volume B: Engineering

2. Volume C: Field Enforcement

3. Volume D: Laboratory Support

4. Volume E: Air Monitoring and Meteorological Support

5. Volume F: Source Testing

6. Volume G: Agency Management, Program Development, and Public Information Support

The descriptive information and staffing guidance presented for each task contains the following:

1. Task Overview. A general overview of the activities included in the task covered and any special directions for interpreting and using the information included.

2. Occupational Category. The occupational category suggested to perform the task. If a senior member of the category is recommended, that is clearly indicated.

3. Task Description. A detailed description of activities included in the task in terms of its component operations.

4. Skill Requirements. A list of the skills required for the activities included in the task.

5. Knowledge Requirements. A list of the knowledge required to perform the activities.

6. References. A list of source materials which provide some of the information required for performance of the activities.

7. Special Staffing Guidance. This section of the information provided for most of the tasks contains additional staffing information specific to the task being described. The kind of information presented varies from task to task and includes:

    a. The level of individual within the suggested occupational category and the justification for the assignment. Whenever a senior level individual is required, that fact is mentioned and the rational for requiring such a person is provided.

b. Special training emphasis required for the task (e.g., emphasis on communication skills).

c. Suggestions regarding the appropriate occupational category for individuals who supervise the task performer or who assist the task performer with the relatively routine or complex portions of the task when the need exists.

APPENDIX

List of Individuals Who Provided Expert Judgments in Selecting Agencies to Visit for Data Collection 33

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Occupational Category Descriptions 42

Individuals Who Provided Expert Judgments in Selecting Agencies to Visit for Data Collection

A. Control Agency Development (CAD) personnel consulted:

N. Berg
K. Foster
G. Demarrois
R. Morrison
J. Richards
H. Richter
D. Smith
T. Williams

B. Regional Air Pollution Control Directors contacted:

J. Busik, Region II
L. Nagel, Region III
T. Gibbs, Region IV
W. Kovalick, Region V
R. Chanslor, Region VII
T. Harris, Region IX
G. Young, Region X

C. Other individuals surveyed:

F. Burmann, specialist in air quality monitoring technology (Division of Abatement, Bureau of Abatement and Control, EPA)

J. Dicke, specialist in meteorology (Institute for Air Pollution Training, EPA)

W. Smith, specialist in source sampling (Institute for Air Pollution Training, EPA)

T. Hartlidge, specialist in air quality monitoring (Institute for Air Pollution Training, EPA)

B. Linsky, University of West Virginia

L. Rogers, Air Pollution Control Association

Personnel Interviewed During Data Collection Phase

A. Allegheny County Bureau of Air Pollution Control

Name	Task Area Discussed
R. Chleboski	Duties of the Agency Director
C. Nim	Coordination with Variance Board
R. Fuller	Instrument Maintenance (Supervisor)
A. Bolger	Development of Regulations
J. O'Donnell	Computer Operations
W. Gore	Data Analysis
A. Griglack	Source Testing (Supervisor)
W. Popiel	Air Monitoring (Supervisor)
D. Pasquerilli	Laboratory Analysis (Supervisor)
W. Strang	Data Processing
J. Hawkins	Public Information
M. Blair	Public Information
B. Bloom	Episode Control
M. Lebowitz	Plan Review
G. Miller	Plan Review
J. Chirico	Field Engineering (Supervisor)
M. Goldberg	Field Engineering
C. McCoy	Field Engineering
S. Feigenbaum	Field Engineering
J. Graham	Field Engineering
K. Karantonis	Support to Legal Staff
J. Connell	Inspection (Supervisor)
R. Meighan	Inspection
DeNardo and McFarland Weather Service, Inc.	Meteorology

B. New Jersey State Bureau of Air Pollution Control

Name	Task Area Discussed
W. Monroe	Duties of the Agency Director
H. Wortreich	Agency Administration
T. Leonard	Field Control Operations (Director)
J. Tozzi	Local Program Development
P. Zigrand	Training Development
L. Goldshore	Legal Consultation
A. Corson	Public Information
J. Depierro	Data Analysis
C. Fleisher	Meteorology
V. Marchesani	Engineering
R. Pfannemstiel	Engineering
M. Green	Engineering
J. Sekkies	Engineering
J. Bowe	Plan Review (Supervisor)
L. Ivy	Plan Review
N. Sanvito	Episode Control
R. Winchester	Enforcement and Inspection
J. Rziglinski	Enforcement and Inspection
J. Skoviak	Enforcement and Inspection
B. Tretheway	Enforcement and Inspection
B. Lind	Source Testing (Supervisor)
J. Elston	Source Testing
R. Lahey	Source Testing
J. Marston	Air Monitoring (Supervisor)
H. Smith	Laboratory Analysis
W. Ormond	Laboratory Analysis

C. Commonwealth of Pennsylvania Bureau of Air Pollution Control

V. Sussman	Duties of the Agency Director
G. Triplett	Agency Administration
D. Lohman	Meteorology

Name	Task Area Discussed
M. Mallin	Enforcement and Support to Legal Staff
R. Kona	Plan Review
D. Lesher	Plan Review
C. Lawson	Plan Review
M. Shah	Plan Review
L. DeHaven	Source Testing (Supervisor)
R. Jordan	Laboratory Analysis (Supervisor)

D. City of Chicago Department of Environmental Control

H. Poston	Duties of the Agency Director
T. Kasson	Agency Administration
C. McGruder	Agency Administration
M. Reidy	Public Information
P. Harrison	Technical Services (Director)
E. Klappenbach	Meteorology (Supervisor)
D. Hanks	Meteorology
E. Petkus	Engineering (Director)
J. Ketchik	Engineering (Supervisor)
R. Seely	Emission Inventory
E. Linna	Plan Review
F. Seefeldt	Plan Review
R. Familiar	Plan Review
J. Comella	Enforcement (Director)
M. Shorr	Inspection (Supervisor)
J. Boc	Inspection
G. Wood	Inspection
E. Pendergast	Inspection
C. Carramusa	Inspection
T. Spittler	Laboratory Analysis (Supervisor)
T. Kowalski	Laboratory Analysis
M. Crowley	Laboratory Analysis
A. Wiorkewski	Laboratory Analysis

Name	Task Area Discussed
J. Diaczun	Laboratory Analysis
S. Wroblowski	Laboratory Analysis
J. Delson	Laboratory Analysis
D. Ferguson	Electronic Equipment Maintenance

E. Wayne County (Michigan) Air Pollution Control Division

M. Sterling	Duties of the Agency Director
F. Hodson	Agency Administration
F. Calico	Special Projects
D. Cambel	Legal Consultation
H. Murry	Public Information
M. Joice	Public Inforamtion
E. Moranty	Enforcement (Supervisor)
C. Andrus	Enforcement (Field Supervisor)
A. Toth	Enforcement
A. Greenberg	Meteorology
B. Baskin	Engineering (Director)
P. Simmone	Plan Review
B. Esch	Emission Inventory
A. Scheans	Plan Review
B. Zane	Plan Review
H. Rabbani	Plan Review
M. Maillard	Source Testing
J. Cutting	Electronic Equipment Maintenance
P. Warner	Laboratory Analysis (Supervisor)
J. Jackson	Laboratory Analysis
L. Saad	Laboratory Analysis
S. Schaldenbrand	Laboratory Analysis

F. State of Michigan Air Pollution Control Section

L. Jager	Duties of the Agency Director

Name	Task Area Discussed
B. Bennett	Instrument Maintenance (Supervisor)
D. Meyer	Enforcement (Supervisor)
A. Vander Kolk	Laboratory Analysis (Supervisor)
J. Shaffer	Source Testing
C. Oviatt	Plan Review

G. California Air Resources Board

Sacramento, California

J. Maga	Duties of the Agency Director
G. Taylor	Agency Administration
B. Lockett	Special Projects and Planning
E. Schmeider	Special Projects and Planning
H. Wong-Woo	Engineering (Supervisor)
T. McGuire	Engineering
R. Bradley	Engineering
E. Menuez	Engineering
T. Xavier	Engineering
R. Menebroker	Engineering
J. Morgester	Engineering
S. Hutchinson	Research Program Development (Supervisor)
L. Resnick	Research Program Development
J. Suder	Research Program Development
H. Samuals	Research Program Development
S. Duckworth	Data Processing and Meteorology (Director)
R. McMullen	Meteorology (Supervisor)
A. Lorenzen	Meteorology
J. Kinasian	Air Monitoring (Supervisor)
K. Nishikawa	Air Monitoring (Supervisor)
D. Crowe	Instrument Maintenance (Supervisor)

Los Angeles, California

A. Hocker	Data Evaluation (Supervisor)
J. Mayrsohn	Special Projects (Supervisor)

Name	Task Area Discussed
A. Bordinaro	Technical Supervisor
A. Bokian	Physicist (Supervisor)
R. O'Brien	Chemist
J. Holmes	Spectroscopist
J. Shikiya	Engineering (Supervisor)
P. Newmark	Engineering
H. Faigin	Engineering
L. Lewis	Engineering

H. Puget Sound Air Pollution Control Agency (Washington)

A. Dammkoehler	Duties of the Agency Director
G. Gelderman	Agency Administration
J. Beasley	Public Information
M. Svoboda	Meteorology (Supervisor)
K. Knechtel	Meteorology
H. Watters	Engineering (Director)
R. Kester	Episode Control
A. Wright	Emission Inventory
J. Roberts	Plan Review
K. Anderson	Engineering
J. Pearson	Plan Review
A. Kellogg	Air Monitoring (Supervisor)
G. Hofer	Source Testing
K. Saito	Instrument Maintenance (Supervisor)
R. Pollock	Laboratory Analysis (Supervisor)
M. Cheney	Clerical Tasks
D. Rogers	Enforcement
J. Eng	Enforcement

I. Los Angeles County Air Pollution Control District

R. Chass	Duties of the Agency Director
P. Brumelle	Planning and Special Projects

Name	Task Area Discussed
J. Bikakos	Public Information
T. Wilkes	Enforcement (Supervisor)
D. Martin	Enforcement (Supervisor)
W. Olson	Enforcement (Supervisor)
F. Darrington	Enforcement
J. Powell	Enforcement
E. Proctor	Enforcement
J. Dixon	Enforcement
J. Nance	Enforcement
M. Fykes	Enforcement
A. Damzig	Enforcement
R. Lippner	Enforcement
R. Keith	Meteorology (Supervisor)
A. Wachtenheim	Meteorology
E. Lemke	Engineering (Director)
R. MacKnight	Engineering (Assistant Director)
J. Williamson	Plan Review (Supervisor)
W. Krenz	Plan Review (Supervisor)
S. Weiss	Plan Review (Supervisor)
R. Weimer	Episode Control
G. Thomas	Emission Inventory
E. White	Emission Inventory
R. Schaffer	Plan Review (Supervisor)
M. Cohen	Plan Review
K. Vagassaris	Plan Review
P. Talens	Plan Review (Supervisor)
G. Rhett	Plan Review (Supervisor)
J. Taylor	Technical Services (Asst. Supervisor)
H. DeVorkin	Source Testing (Supervisor)
R. MacPhee	Laboratory Analysis (Supervisor)
A. Salo	Laboratory Analysis
M. Yozore	Laboratory Analysis
J. Higuchi	Laboratory Analysis

NATIONAL AIR POLLUTION MANPOWER DEVELOPMENT ADVISORY COMMITTEE

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Riverside, California

Paul Urone, Ph.D.
Professor of Atmospheric Chemistry
Department of Environmental Engineerin
University of Florida
Gainesville, Florida

OCCUPATIONAL CATEGORY DESCRIPTIONS

ENGINEER

General Duties

Personnel in this category are responsible for tasks which generally require engineering analysis and evaluation of basic and control equipment used in industrial, commercial, and public sectors. The primary areas of agency activity in which engineers play a major role include:

1. Plan review/permit processing
2. Emission inventory
3. Episode control
4. On-site equipment examination
5. Compliance program development and management
6. Special studies (e.g., evaluation of new control techniques or equipment).
7. Source testing

The duties of Engineers typically involve detailed analysis and evaluation of the effectiveness of proposed and existing air pollution control equipment and determination of the potential emissions of controlled or uncontrolled basic equipment in a wide variety of processes. Engineers are responsible for evaluating the feasibility and effectiveness of proposed means for curtailing emissions during periods of adverse meteorological conditions and for convincing managers of sources to accept reasonable and effective curtailment methods. The predominate characteristic of the Engineer's activities is the need to solve a broad variety of multi-disciplinary engineering problems under conditions of minimum structure, a high contingency probability, and close public scrutiny.

Representative Assignments

1. Review application forms, plans, and design data in order to evaluate the acceptability of proposed basic equipment or control devices.

2. Perform detailed inspections of basic or control equipment installations with regard to plan review requirements (e.g., to assure that equipment installed under a permit meets the conditions of the permit).

3. Develop specific compliance programs for particular sources and monitor their progress in meeting the requirements of the program.

4. Analyze industrial processes to identify operations with pollution potential and use emission estimation procedures to develop an emission inventory.

5. Evaluate source curtailment plans submitted by industrial/commercial facilities in response to episode control system requirements.

6. Provide engineering assistance (as required) to agency personnel and public and private sectors relevant to air pollution control technology. For example, serve on zoning commissions, provide technical data to agency enforcement personnel in a complaint investigation, or lecture citizen groups on local air pollution control efforts and control technology.

7. Appear in court or at hearings as an expert technical witness in actions such as variance proceedings, enforcement actions, and in support of the agency's position on new or modified regulations.

8. Maintain direct contact with industry and commerce, and represent the agency in its control and regulatory efforts.

Representative Skill and Knowledge Qualifications

1. Ability to communicate in written and spoken form to a variety of types of audiences (both technical and non-technical).

2. Ability to apply general, systematic problem-solving techniques to conceptual and technical problems.

3. Ability to use data manipulation aids including desk calculators, slide rule, nomographs, data tables, and graphs.

4. Ability to prepare, read, and interpret engineering drawings, plans, or technical specifications.

5. Ability to apply basic engineering skills and knowledge to the analysis and evaluation of basic and control equipment used in industrial, commercial, and public facilities.

6. Basic knowledge of industrial processes, equipment, and practices which are relevant to air pollution control.

7. Knowledge of basic engineering principles, analytic procedures, and applied techniques (including mathematical, statistical, or chemical data manipulation methods).

8. Knowledge of engineering resource materials.

Minimum Acceptable Educational Background

Bachelor's degree with a major in engineering. Advanced education or training will be required to provide the skills and knowledge necessary to perform specific tasks to which the individual is assigned.

ENGINEERING TECHNICIAN

General Duties

Personnel in this category perform relatively routine and proceduralized tasks in support of the agency's engineering function. Their role is generally one of asisting Engineers in areas including:

1. Plan review/permit processing
2. Emission inventory
3. Episode control
4. On-site equipment examination
5. Compliance program development and management
6. Special studies (e.g., evaluation of new techniques or equipment for air pollution control)

The tasks performed by an Engineering Technician typically involve collection of data or information, relatively standardized data analysis and manipulation, straightforward calculations which can be easily proceduralized, basic screening of equipment designs, uncomplicated equipment inspections, and routine communications with the agency constituency regarding engineering functions.

Representative Assignments

1. Receive and make preliminary check on the completeness of permit applications and supporting descriptive materials.
2. Calculate plan review/permit processing fees (if an adequately proceduralized routine exists).
3. Perform proceduralized emission estimation calculations.
4. Coordinate emission inventory data collection mailings, and record input data as it comes in.
5. Make routine check of ambient air and meteorological conditions and detect when critical values are reached (with regard to episode control procedures).

6. Prepare data collection formats for emission inventory or episode control programs after the data requirements and method of collection have been identified.

7. Review applications for tax exemptions on air pollution control equipment which has been granted a permit to operate.

8. Routine recordkeeping of progress reported in compliance programs for specific industries or facilities.

Representative Skill and Knowledge Qualifications

1. Ability to accurately perform arithmetic calculations and perform algebraic manipulations.

2. Ability to use a desk calculator and use nomographs, data tables, and other aids to data manipulation.

3. General ability to read and interpret basic engineering drawings and industrial process flow charts.

4. Ability to communicate effectively in spoken and written form.

5. Ability to follow procedures, being careful to accurately perform all required steps.

6. General knowledge of the basic equipment, practices, and operations used in industrial and commercial processes, including:

    a. Metal melting

    b. Dry material handling (e.g., cement batching)

    c. Dry cleaning

    d. Surface coating

    e. Incineration

    f. Combustion (e.g., power generation)

    g. Storage vessels (e.g., open top tanks)

Minimum Acceptable Educational Background

High school diploma (or equivalent) with course work in mathematics (through algebra and basic analytic geometry) and physical science (e.g., chemistry

and physics). This formal education will have to be augmented with technical training to provide the skills and knowledge required for the specific tasks to which the individual is assigned.

CHEMIST

General Duties

Personnel in this category generally perform supervisory roles in a chemical laboratory operation supporting the agency's air monitoring and source testing efforts. In addition, Chemists are involved in the design of air monitoring systems and in the development of new laboratory procedures, techniques, and equipment.

Representative Assignments

1. Supervise Chemical Laboratory Technicians performing standard analyses procedures.
2. Develop new methods for the analysis of air pollutants.
3. Supervise Equipment Technicians involved in maintenance of laboratory equipment.
4. Design air monitoring facilities and systems. This task may be performed cooperatively with Engineers or agency planning personnel.
5. Design, supervise, and report scientific or applied research (e.g., evaluation of the effectiveness of new analysis techniques or instruments).

Representative Skill and Knowledge Qualifications

1. Ability to communicate effectively in written and spoken form.
2. Ability to apply general, systematic problem-solving techniques to conceptual and technical problems.
3. Detailed knowledge of chemical and physical techniques, procedures, concepts, and equipment relevant to analysis of pollutant concentrations.
4. Basic knowledge of general industrial processes and chemical and physical nature of their effluents.

5. Knowledge of basic scientific and technical resource literature available which is relevant to the analyses commonly performed in agency laboratories.

6. Knowledge of the hazards to be observed in performing analyses in the chemical laboratory.

7. Detailed knowledge of the scientific method and of research design principles.

8. Detailed knowledge of the procedures and techniques for use of standard laboratory devices.

9. Knowledge of proper analytic procedures for obtaining valid results. This knowledge should be sufficient to:

    a. Identify errors possible in each step of the procedure and their effect on the final outcome of the analysis.

    b. Identify critical steps in the procedure. A critical step is one in which

        (1) Errors are known to frequently occur

        (2) Little margin for error exists

        (3) Errors are likely to go undetected

    c. Revise procedures so as to reduce the possibility of error.

10. Knowledge of the chemical, electrical, and mechanical principles of operation of the various analysis instruments sufficient to:

    a. Identify instrument malfunctions which could go undetected and result in inaccurate read-out (to the extent not already documented in existing service manuals).

    b. Develop procedures for the timely discovery of such malfunctions.

    c. Identify the effects of incorrect instrument operation on instrument read-out.

Minimum Acceptable Educational Background

Bachelor's Degree in chemistry. Advanced education or training will be required to provide the skills and knowledge necessary to perform specific tasks to which the individual is assigned.

CHEMICAL LABORATORY TECHNICIAN

General Duties

The Chemical Laboratory Technician performs proceduralized, standard wet test chemical analyses of atmospheric pollutants in a laboratory setting under close supervision of a Chemist.

The tasks performed by the Chemical Laboratory Technician typically involve the following general activities:

1. Preparing, labeling, standardizing, and storing reagents; maintaining a record of their ages; and disposing of them when their recommended shelf life has been exceeded.
2. Distilling water required for chemical analyses.
3. Cleaning and assembling apparatus.
4. Conducting analyses according to detailed step-by-step directions, receiving assistance from a Chemist as required.
5. Recording the results of the analysis in a standard form (including deviations from the standard procedure).
6. Calculating pollutant concentration using detailed step-by-step directions.
7. Reporting all calculations in standard form to a Chemist.
8. Disassembling, cleaning, and storing all apparatus.

Representative Assignments

The following tasks are representative of the type of tasks the Chemical Laboratory Technician could perform with appropriate supervision:

1. Determination of Nitrogen Dioxide and Nitric Oxide Concentrations in the Atmosphere Using the Saltzman Method.

2. Determination of Sulfur Dioxide Concentration in the Atmosphere Using the West-Gaeke Method.

3. Determination of Sulfur Dioxide and Sulfur Trioxide Concentrations in Stack Gases.

Representative Skill and Knowledge Qualifications

1. Ability to perform basic laboratory operations typically required for the type of chemical analysis procedures performed by the Chemical Laboratory Technician. Such operations include:
   a. Preparing reagents and handling caustic or otherwise dangerous chemicals without splattering acid, precipitating an explosion, or otherwise damaging personnel or equipment.
   b. Obtaining definite volumes of solutions using apparatus such as a pipette, syringe, volumetric flask, or burette.
   c. Using an analytical balance to obtain an accurate weight of a dry reagent or filter.
   d. Cleaning glassware and other apparatus without breakage or injury to oneself.
   e. Performing a quantitative transfer of a solution from one container to another without losing any of the sample.
   f. Cleaning grease from the neck of a flask without contaminating the contained sample with the cleaning agent.
2. Ability to read indicating devices, such as a thermometer, manometer, dry gas meter, and flowmeter, and to interpret meter readings.
3. Ability to follow directions for assembling sampling apparatus with each component in proper sequence.
4. Ability to read and interpret data from tables, psychometric charts, or nomographs.
5. Ability to perform arithmetic calculations and resolve algebraic equations in four variables, using detailed step-by-step procedures.
6. Ability to accurately and completely follow procedures and directions.

7. Knowledge of general damages and hazards common to work in a chemical laboratory.

8. Basic knowledge of chemical concepts and nomenclature (e.g., metric units, reagents, common laboratory glassware).

Minimum Acceptable Educational Background

High school diploma (or equivalent) with courses in chemistry and algebra. This formal education will have to be augmented with technical training to provide the skills and knowledge required for the specific tasks to which the individual is assigned.

METEOROLOGIST

General Duties

Personnel in this category are responsible for tasks which require analysis or prediction of meteorological conditions and their effects on concentrations, distribution, and diffusion of air contaminants. The primary areas of agency activity in which Meteorologists function include:

1. Air monitoring
2. Episode control
3. Plan review (in predicting emission concentrations at ground level as a function of meteorological conditions)
4. Daily forecasts or reports of pollution conditions
5. Research in pollution forecasting methods
6. Source testing
7. Modelling of pollution phenomena to solve large scale planning problems (e.g., source siting).

The duties of the Meteorologist involve detailed analysis, forecasting, and interpretation of meteorological factors and their impact on pollution conditions. The Meteorologist is also involved in developing new and improved methods for achieving his objectives. His tasks are characterized by high contingency probability, often inadequate technology for problem solution, and close public attention to his pronouncements.

Representative Assignments

1. Problem solving using mathematical models (e.g., diffusion models).
2. Routine forecasting of meteorological conditions and pollution level effects.
3. Purchasing and evaluating meteorological instruments.

4. Developing objective methods for predicting pollution conditions from known local emission characteristics, meteorological conditions, and other factors (e.g., topographical features).

5. Assisting in development of the episode control system.

6. Determining locations for air monitoring stations.

Representative Skill and Knowledge Qualifications

1. Ability to communicate effectively in written and spoken form.

2. Ability to apply systematic problem-solving techniques to the solution of conceptual and technical problems.

3. Detailed knowledge of National Weather Service services and products relevant to forecasting local meteorological conditions.

4. Knowledge of accepted meteorological forecasting procedures and techniques.

5. Knowledge of probability theory, statistical methods, and appropriate interpretation of statistical findings.

6. Basic knowledge of industrial processes; the chemical or physical properties of their effluents; and their interaction with atmospheric and meteorological conditions.

7. Basic knowledge of air pollution control technology and regulatory activities.

8. Knowledge of the state-of-the-art in areas including:

   a. Meteorological and air quality monitoring systems.

   b. Automatic data transmission, processing, and display equipment.

9. Knowledge of basic principles of use and interpretation of mathematical modeling methods and results.

Minimum Acceptable Educational Background

Bachelor's Degree in meteorology (with course work in mathematics or engineering). Advanced training or formal education may be required to provide the skills and knowledge necessary to perform specific tasks to which the individual is assigned.

METEOROLOGICAL TECHNICIAN

General Duties

Individuals in this occupational category support the agency's Meteorologist by performing relatively proceduralized functions including:

1. Assembly or collection of meteorological data.
2. Manipulation or analysis of meteorological data.
3. Preparation of routine announcements of weather and pollution conditions.
4. Routine maintenance of meteorological instruments.
5. Preparation of findings for presentation in published reports.

In performing the above functions, the Meteorological Technician inputs directly to, and is supervised by, a Meteorologist. The tasks performed by a Meteorological Technician typically involve collection of data or information, relatively standardized data analysis and manipulation, straightforward calculations which can be easily proceduralized, basic monitoring of meteorological and ambient air equipment, and communications with the public and news media to report current conditions and forecasts.

Representative Assignments

1. Collect meteorological data from agency air monitoring stations.
2. Assemble meteorological data (e.g., from daily teletype printout), format it, and describe current or past climatological conditions (e.g., presence and strength of inversions).
3. Perform correlations and other standard statistical procedures in support of Meteorologists investigating the relationship of meteorological conditions and pollution.

4. Document routine public information statements which describe current or forecasted meteorological and pollution conditions (e.g., format relevant information and make it available to local news media).

5. Perform proceduralized, routine maintenance on meteorological monitoring equipment. This task can also be performed by the Equipment Technician.

6. Carry out proceduralized tasks required in performing and reporting research in the areas of meteorology and air pollution control, for example: preparation of data tables, graphs, wind roses, surface maps, etc., using data provided by the Meteorologist.

7. In a sufficiently proceduralized Episode Alert System, monitor ambient air or meteorological conditions for early signs of a developing episode.

8. In a sufficiently objective and proceduralized pollution condition forecasting system, predict basic pollution levels as a function of current or forecasted meteorological conditions or other factors (e.g., time of year).

Representative Skill and Knowledge Qualifications

1. Ability to accurately perform arithmetic calculations and algebraic manipulations.

2. Ability to use a desk calculator, nomographs, data tables, and other data manipulation aids.

3. Ability to accurately and completely follow procedures and directions.

4. Knowledge of the meteorological terminology and concepts used in air pollution control-related tasks and at a level of detail appropriate to the type of proceduralized tasks in which the Associate Meteorologist participates.

5. A basic knowledge of the relationship of air pollution contaminant levels to general meteorological conditions.

6. Knowledge of the basic principles of graphing data on two-or three-dimensional plotting systems and the ability to plot data neatly and accurately.

Minimum Acceptable Educational Background

High school diploma, with emphasis on science and mathematics (including algebra and analytic geometry). This formal education will have to be augmented with technical training to provide the skills and knowledge required for the specific tasks to which the individual is assigned.

FIELD ENFORCEMENT OFFICER

General Duties

Personnel in this occupational category generally work to enforce agency control and regulatory efforts through inspecting and policing activities. In addition, they can perform a variety of administrative activities which support the direct field enforcement operation. The areas of the Field Enforcement Officer's activities include:

1. Routine inspections
2. Complaint handling and investigation
3. Surveillance and Patrol
4. Identification of violations and performance of appropriate enforcement procedures
5. Smokeschool administration
6. Assist agency legal staff

The role of the Field Enforcement Officer typically does not require a high level of technical expertise in areas of engineering, industrial process, or air pollution control equipment design and performance characteristics. Most of their operations are routine and usually standardized. However, members of this group have a great deal of contact with the public, and this element of their effort does not lend itself to proceduralization.

Representative Assignments

1. Perform routine and partially proceduralized inspection of small commercial or industrial facilities. Such inspections can be in support of:
   a. Complaint investigations.
   b. Enforcement of the agency's episode control system requirements.

c. Enforcement of the agency's permit system requirements

d. Annual boiler or incinerator inspection requirements

2. Patrol areas of the agency's jurisdiction looking for violations of the regulations relevant to mobile or stationary sources.

3. Organize, prepare, and administer smoke-reading training for agency personnel.

4. Document complaints and pursue complaint investigations with the objective of identifying legitimate complaints and satisfying the complainant's requests.

5. Perform routine and proceduralized enforcement tasks, including reporting and serving violation notices and testifying as a witness in court as required.

6. Assist the agency legal staff in preparing proceduralized and routine documentation and evidence for use in legal actions.

Representative Skill and Knowledge Qualifications

1. Ability to effectively interact and communicate with complainants and the management of facilities to be inspected.

2. Ability to read basic engineering or process flow diagrams.

3. Ability to perform arithmetic computations.

4. Ability to follow procedures, being careful to accurately perform all required steps.

5. Basic knowledge of small to medium size industrial or commercial processes relevant to air pollution (e.g., paint spraying, dry cleaning, incineration, and fuel combustion equipment).

6. Basic knowledge of terminology used in air pollution control operations.

Minimum Acceptable Educational Background

High school diploma (or equivalent). This formal education will have to be augmerted with technical training to provide the skills and knowledge required for the specific jobs to which the individual is assigned.

PUBLIC INFORMATION SPECIALIST

General Duties

Personnel in this category implement the public information program and policies of the agency. Their role is to prepare public information presentations in various media and for a variety of audiences. Their work requires them to articulate technical, legal, scientific, and medical facts and concepts in a manner which is sensitive to the information needs of the audience and the objectives of the communication.

Representative Assignments

1. Prepare public information presentations.
2. Contribute to development of an agency public information policy.
3. Arrange public information events such as press conferences, television appearances for staff members, and publicity activities (e.g., exhibits or demonstrations).

Representative Skill and Knowledge Qualifications

1. Ability to design and write effective prose.
2. Ability to orally communicate effectively with individuals of widely divergent professional or technical interests.
3. Ability to quickly learn technical knowledge, legal requirements, and scientific findings relevant to the area of air pollution control.
4. Ability to research technical and scientific literature.
5. Knowledge of media andproduction areas relevant to development of a public information presentation.
6. Knowledge of the procedures for developing, maintaining, and utilizing contacts with personnel in mass media and other information dissemination positions.

Minimum Acceptable Educational Background

Bachelor's Degree with a major in an areas such as journalism, literature, advertising, English, etc., with some background in physical science or engineering.

AIR POLLUTION CONTROL DIRECTOR

General Duties

The Air Pollution Control Director is responsible for leadership of the agency's technical, administrative, and regulatory activities. As such, his activities can be generally characterized to include:

1. Collecting information required for guidance and development of agency efforts.
2. Making decisions concerning agency policy and objectives.
3. Coordinating and directing the planning and development of agency activities.
4. Coordinating, directing, and evaluating agency activities and progress.
5. Representing the agency in interactions with its constituency (public and private sectors) and with various governmental bodies.

Representative Assignments

1. Communicate with organized citizen groups to determine their goals and desires with regard to air pollution control and the extent to which they are satisfied by agency efforts.
2. Identify the expectations and performance criteria of governmental agencies (federal, state, or local) which provide funds or otherwise support agency activities.
3. Consult with attorneys and establish guidelines for the interpretation of specific local regulations.
4. Coordinate preparation of the agency's annual budget, evaluate it with regard to agency objectives, and defend it before a governmental funding agency. Provide liaison with controlling legislative bodies.

5. Direct development of the agency's position with regard to new or modified regulations.

6. Coordinate development of new techniques and materials required to implement proposed or newly promulgated regulations.

7. Routinely review and evaluate published materials depicting the state-of-the-art in technical and management areas (e.g., air pollution control technology, personnel management techniques, program planning and budgeting methods, latest legal interpretations and precedents).

8. Coordinate or direct agency personnel recruitment, training, and performance evaluation systems.

9. Negotiate with representatives of a major pollution source to work out a suitable compliance program (including equipment to be installed and an acceptable timetable).

10. Conduct press conferences with news media.

Representative Skill and Knowledge Qualifications

1. Ability to effectively chair public or private meetings intended to generate questions, comments, criticisms, or recommended modification to proposed regulations or activities.

2. Ability to communicate effectively in written or spoken form with representatives of industry, citizen groups, or politicians to accomplish functions including:

    a. Solicit criticisms, expectations, demands and supporting technical information relevant to development of new regulations or agency policy.

    b. "Sell" the agency's position on the proposed regulation.

    c. Negotiate a compromise version of the regulation which meets the requirements of the agency and satisfies the pressure groups.

    d. Promote and explain an episode control system.

    e. Aid in development of local control programs.

3. Ability to judge current local political or economic conditions and react to them accordingly in developing agency activities or policy.

4. Ability to systematically and effectively solve problems or make decisions. This general skill includes:

    a. Ability to accurately define the problem in terms of objective, desirable outcome.

    b. Ability to accurately and completely identify the elements of the situation which affect selection or development of a solution.

5. Ability to integrate knowledge of agency capability, past experience, local regulations, and knowledge of the state-of-the-art in air pollution control and regulatory technology to define and then seek to achieve agency objectives.

6. Ability to coordinate an on-going evaluation of local agency internal training, procedure development, and external activities (e.g., performance of control and regulatory efforts).

7. Ability to select enforcement actions which are appropriate for specific types of violations and circumstances. This skill may require the ability to interact with attorneys and enforcement personnel in selecting the appropriate enforcement action.

8. Ability to evaluate the quantity and quality of work produced by the staff and discriminate acceptable from unacceptable performance. This skill assumes the ability to develop or use criteria of performance acceptability.

9. Knowledge of the technical areas of air pollution control and industrial processes at a level of detail required for management activities, including:

    a. Development or approval of new regulations.

    b. Response to questions and criticism regarding agency activity from newsmen, the public, governmental bodies.

    c. Development or approval of specific compliance programs.

d. High level supervision of the agency's activities in technical, engineering, and enforcement areas.

e. Agency policy and program development.

10. Knowledge of the types of situations which can occur and which signal the need for developing new regulations or amending current regulations. Such conditions include:

a. A new Federal ambient air quality standard is promulgated for a specific contaminant.

b. Current emission standards are not achieving the desired effect on air quality.

c. A breakthrough in air pollution control technology has occurred which makes a new generation of emission standards achievable.

d. There has been an excessive number of single-chamber incinerator smoke violations.

e. Scientific evidence has been published showing significant health effects due to a contaminant which is currently emitted without being controlled by regulations.

f. The penalty for a specific violation does not appear to be having a significant deterrent effect.

11. Knowledge of systematic approaches which are useful for problem solving and planning of work activities (e.g., the "systems" approach to design).

12. Knowledge of procedures for maintaining contact with the elements of the agency's working context which affect or are affected by its performance. These elements include:

a. The public sector.

b. The industrial/commercial community.

c. Local governmental and quasi-governmental bodies which interface with agency activities (e.g., advisory board, variance board, public health department).

Minimum Acceptable Educational Background

Bachelor's Degree in a technical or scientific area relevant to air pollution control. Advanced education and training will be necessary to acquire the skills and knowledge required to perform the Director's tasks.

EQUIPMENT TECHNICIAN

General Duties

The Equipment Technician operates and maintains the equipment and instrumentation used for various agency activities (e.g., laboratory analysis, source testing, meteorology). His primary functions include:

1. Performance of highly proceduralized standard installation, service, troubleshooting, repair, and calibration procedures on laboratory instrumentation and analyzers.
2. Maintenance of specialized research tools (e.g., a Smog Chamber) and the operation of them to carry out preplanned experimental procedures.
3. Collection of particulate and/or gaseous samples in conjunction with stack and mobile source tests.
4. Conduct of odor tests.
5. Installation, operation, and performance of proceduralized maintenance on the chassis and engine dynamometers.

Representative Assignments

1. Maintenance of equipment such as the colorimeter, atomic absorption spectrophotometer, and the X-ray defractometer.
2. Perform operation and maintenance of equipment such as the A.I.S.I. Automatic Sampler, High Volume Air Sampler, Coulometric Titration Analyzer and the Colorimetric air monitoring equipment.
3. Performance of a stack test, odor test, used car inspection, and Idle or ACID test.
4. Maintain a stock of spare parts as necessary to service and maintain the various instruments.

5. Establish and maintain a shop facility with the instrumentation, tools, and reference manuals necessary to install, service, troubleshoot, and maintain the various instruments.

6. Arrange for the return of malfunctioning instruments or components for factory repair as necessary.

Representative Skill and Knowledge Qualifications

1. Ability to quickly and correctly solve an algebraic equation in several unknowns using a detailed step-by-step procedure.

2. Ability to read and interpret basic equipment design drawings (e.g., electronic schematics, wiring diagrams, piping and tubing diagrams, and troubleshooting charts).

3. Ability to accurately and completely follow procedures and directions.

4. Ability to effectively use common hand tools and test instruments required in equipment maintenance (e.g., screw drivers, wrenches, ohmmeter, ammeter).

5. Ability to solder and unsolder electrical terminals.

6. Ability to determine and apply effective strategies for troubleshooting electronic equipment.

7. Basic knowledge of electronic theory, sonic conductors and state-of-the-art electronic devices and packaging.

Minimum Acceptable Educational Background

High school graduate (or equivalent) with course work in chemistry, mathematics, or physics. An alternate background would be a vocational education course in high school with emphasis on electronic equipment operation and maintenance. Further technical training will be necessary to acquire the skills and knowledge required to perform the tasks to which the individual will be assigned.

RESOURCES ADMINISTRATOR

General Duties

Personnel of this type have a highly specialized function within the agency. Their role is high level management of the agency's financial, personnel, and material resources. Their role frequently allows them only superficial involvement in the agency's technical or regulatory efforts. The Resources Administrator's responsibilities primarily are in areas including:

1. Development and implementation of budgets.
2. Administration of agency personnel selection, training, and performance evaluation.
3. Preparation of requests for grants and other forms of financial aid.
4. Development and implementation of the agency's purchasing policy and procedures.

Representative Assignments

1. Assist in the development and continuing refinement of the agency's personnel policy and procedures.
2. Work with technical and clerical supervisors to identify current and anticipated manpower requirements.
3. Assist in the solution of personnel relations problems (e.g., act as an arbitrator or counselor in problems involving individuals and their supervisors, work with shop steward in unionized agencies).
4. Supervise administration of employee benefits program (e.g., vacation leave, retirement plans, life insurance plans, sick leave, etc.).

5. Supervise administration of the personnel performance review/ evaluation system.

6. Direct the development of purchasing procedures, materials, and paper flow.

7. Supervise the proceurement of equipment and supplies. Evaluate the justification for all major purchases.

8. Supervise the equipment inventory system and related records.

9. Coordinate development of the agency's annual budget. This requires close interaction with supervisors of the agency's various operational divisions.

10. Manage actual expenditures to maintain the budget. This effort may result in a working budget which reflects the estimated expenditures of the various divisions and groups within the agency.

11. Maintain records and prepare reports describing expenditure of grant funds.

12. Supervise administration of accounting procedures.

Representative Skill and Knowledge Qualifications

1. Ability to acquire sufficient knowledge of air pollution technology and control agency activities at a level of detail sufficient to support interaction with agency personnel in:

    a. Budget development and program planning

    b. Purchasing

    c. Development of job specifications

2. Ability to communicate effectively in both written and spoken form to a variety of technical and non-technical audiences.

3. Ability to counsel agency personnel with grievances and to work with union officials in cases in which they are involved.

4. Ability to interpret agency policy in developing and planning agency activities. This skill involves the ability to discriminate whether or not planned activities are consistent with agency policy.

5. Ability to direct or coordinate development and implementation of policies and procedures governing:

    a. Purchasing and inventory management.

    b. Personnel management.

    c. Financial management (e.g., budget planning and implementation).

6. Knowledge of procedures and techniques for developing and implementing programs in the areas of personnel selection, training, and performance evaluation.

7. Background knowledge sufficient to support evaluation and implementation of new techniques in areas including:

    a. Personnel management

    b. Organizational structure

    c. Program and budgetary planning

    d. Computerized data filing and acquisition systems

8. Knowledge of accepted procedures and techniques for planning the use of resources (personnel, material, and financial) to accomplish a specific work goal. This includes the ability to modify plans in response to contingencies (e.g., delays caused by difficulty in obtaining required information such that the production schedule is affected).

9. Knowledge of the state-of-the-art methods in program planning and budgeting (for example, Program Evaluation and Review Technique, Plan Programming Budgeting System).

10. Knowledge of basic accounting methods such as preparation of trial balance and financial statements (using general journal and general ledger methods).

11. Knowledge of procedures for developing and administering employee benefit programs including vacation leave, insurance plans, sick leave, etc.

12. Knowledge of equipment accountability and inventory control procedures.

Minimum Acceptable Educational Background

Bachelor's Degree in a relevant area of business or public administration with some course work in physical science or engineering. Advanced education or training will be required to acquire the skills and knowledge needed for tasks to which the individual will be assigned.

PROGRAM PLANNING AND DEVELOPMENT SPECIALIST

General Duties

Personnel in this category perform a variety of staff level tasks relevant to development and evaluation of the agency's programs, policies, and regulations. Their duties typically require systematic solution of problems requiring relatively broad knowledge and skills in the areas of air pollution control and regulatory methods. Frequently, they will have to represent the agency in interactions with high level officials in both private and public sectors of the agency's constituency.

Representative Assignments

1. Literature reviews and development of data summaries regarding ambient air quality standards.
2. Development of new or modified air pollution control regulations.
3. Development of local control agencies within a coordinated state program.

Representative Skill and Knowledge Qualifications

1. Ability to communicate in written and spoken form to a variety of audience types (both technical and non-technical) at all levels of the private or public sector of the agency's constituency.
2. Ability to apply general, systematic problem solving techniques to conceptual and technical problems.
3. Ability to use data manipulation aids including desk calculators, slide rule, nomographs, data tables, and graphs.
4. Ability to prepare, read, and interpret engineering drawings, plans, or technical specifications.
5. Basic knowledge of industrial processes, equipment, and practices which are relevant to air pollution control.

6. Basic knowledge of air pollution control and regulatory technology and procedures.

7. Knowledge of literature search methods and library resources in areas relevant to air pollution control and regulatory activities.

Minimum Acceptable Educational Background

Bachelor's Degree in a technical or scientific field relevant to air pollution control (e.g., engineering, physics, chemistry). Advanced education or training will be necessary to acquire the skills and knowledge required to perform the tasks to which the individual will be assigned.